



Consumers  
Power  
Company

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81-02 #2

April 16, 1981

Mr J G Keppler, Regional Director  
Office of Inspection & Enforcement  
US Nuclear Regulatory Commission  
Region III  
799 Roosevelt Road  
Glen Ellyn, IL 60137



MIDLAND PROJECT  
DOCKET NOS 50-329, 50-330  
AUXILIARY BUILDING SEISMIC ANALYSIS  
FILE: 0.4.9.48 UFI: 73\*10\*01, 70\*01\*11\*03, 45\*05\*20 SERIAL: 11972

Reference: CPCo letter to J G Keppler, Same Subject, Serial No 11200,  
dated February 20, 1981

This letter, as was the referenced letter, is an interim 50.55(e) report  
concerning the auxiliary building seismic analysis. Enclosure 1 provides  
a status of the planned corrective actions.

Another report, either interim or final, will be sent on or before May 29,  
1981.

*James W. Cook*

JLW/lr

Enclosure 1: MCAR-47, Interim Report No 2, dated April 3, 1981 -  
"Auxiliary Building Seismic Analysis"

CC: Director of Office of Inspection & Enforcement  
Att Mr Victor Stello, USNRC (15)

Director, Office of Management  
Information & Program Control, USNRC (1)

RJCook, USNRC Resident Inspector  
Midland Nuclear Plant (1)

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# Bechtel Associates Professional Corporation

Enclosure 1  
Serial 11972  
81-02 #2

026209

SUBJECT: MCAR 47 (Issued 1/29/81)  
Auxiliary Building Seismic Analysis

INTERIM REPORT 2

DATE: April 3, 1981

PROJECT: Consumers Power Company  
Midland Plant Units 1 and 2  
Bechtel Job 7220

## Description

During a seismic reanalysis associated with 50.54(f) plant fill issue, it was noted that the 1977 auxiliary building seismic model considered the control tower and the main portion of the auxiliary building as an integral unit between el 614' and 659'. This assumption may not be appropriate for the north-south direction because of the connection between the control tower and the main structure which consists primarily of reinforced concrete slabs. The auxiliary building and the control tower were structurally designed to a 1974 seismic model which included flexibility at the connection between the control tower and main structure. Equipment and systems have been seismically qualified using output from both the 1974 and 1977 seismic models.

## Potential Safety Implications

Based on preliminary findings, this item does not have a safety impact on the stability of the auxiliary building as a whole. However, potential safety implications are indeterminate at this time for the structural design of the control tower, structural steel superstructure, and electrical penetration areas (all of which are above el 659'), and systems supported within the auxiliary building.

## Investigation

The investigation presented is limited to the new definition of the north-south, 1977 seismic model (FSAR Figure 3.7-10) initiated solely to determine the safety impact of the condition. Because the control tower and the main auxiliary building (el 614' to 659') were modeled as two separate structures connected by a flexible link, this investigation will consider possible changes in the building forces and floor response spectra curves. The structural behavior in the east-west and vertical directions would not be affected by this change in the model.

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The investigation presented herein does not include the model modification in process to resolve analysis necessary for the 50.54(f) plant fill issue.

The investigation with this model considers:

- 1) A response spectrum analysis to develop building responses
- 2) A time-history analysis to develop in-structure floor response spectra at selected locations
- 3) Comparison of building responses to values calculated in 1974 and 1977, and to allowable forces if necessary
- 4) Comparison of in-structure floor response spectra to those generated in 1977, at selected locations, and comparison of loads in selected piping systems and equipment systems to allowable loads if necessary

The current status of this investigation follows.

- 1) The response spectrum analysis has been completed.
- 2) The time-history analysis and selected in-structure floor response spectra have been generated.
- 3) A comparison of the building forces at the base has been made. The total building base moment and shear have increased by 2% and 1%, respectively, values that are not significant with respect to overall building stability. The moment and shear in the control tower, structural steel superstructure, and electrical penetration areas are under investigation.
- 4) A comparison of the in-structure response spectra curves has been made and indicates that the majority of the floor spectra curves have little or no change. The greatest changes were confined to the structural steel superstructure, control tower, and electrical penetration areas above el 659'. The potential safety impact of these changes is being evaluated for selected piping systems.

The piping systems were selected for evaluation based upon:

- a. Potential for greatest change
- b. Stresses before reanalysis were near allowable

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Preliminary analysis on the selected portion of the piping system showed small or moderate changes in the restraint loads in most cases, and significant changes in a few isolated cases. Analysis is continuing.

Equipment systems in the area affected were found to be acceptable. Equipment was selected to be checked based on its potential for change. The area above el 674'-6" in the auxiliary building, excluding the east and west main portions, has been identified as the area where the in-structure response spectra have had the greatest change. In other areas, the new spectra did not differ significantly from the existing spectra. The mechanical equipment list was examined to locate equipment in this area that was seismically qualified (Q-listed). The revised spectra were compared to the spectra used to seismically qualify the equipment, and the status was determined. A review of vendor documents for equipment in this area of the auxiliary building indicated that the equipment seismic qualification is adequate.

## Corrective Action Completed

- 1) During the week ending January 23, 1981, the assumption that the control tower and the main portion of the auxiliary building is a nonintegral unit between el 614' and 659' was incorporated into a modified model of the auxiliary building. Accordingly, this action is complete.
- 2) The structural response analysis has been completed.
- 3) The time-history analysis and corresponding in-structure floor response spectra have been generated.
- 4) The existing equipment seismic qualification records have been reviewed and found to still be adequate.

## Corrective Action to be Completed

- 1) Complete the investigation of the structural design in affected areas of the structure
- 2) Complete the investigation of selected piping systems; this is expected to be completed by April 20, 1981
- 3) Establish whether this is "reportable" based on results of the investigation described above

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## Root Cause

This error, the magnitude and implications of which are still to be determined, was not procedural. That is, it was not caused by a failure to follow a procedure. All procedures pertaining to the origination, checking, review, and approval of calculations appear to have been followed.

It is an error of a technical nature, involving a specialized technical determination of the most efficient way to mathematically model a physical feature of the structure. The methods and values used were appropriate for the east-west direction, but detailed design review revealed that the procedures used did not adequately represent the structure in the north-south direction.

The checker of these calculations did not identify this error.

Because these parameters are specifically and uniquely determined for each portion of the structure, it is believed that this error can be considered to be a random occurrence with no generic implications. Hence, there is no generic or process corrective action planned; all personnel involved in this area of design are aware of this problem and the need for careful checking will be reemphasized. Due to the soils problem and foundation modifications, the other models are being reviewed and will be modified if necessary.

## Other Activities Not Within the Scope of this MCAR

The scope of this MCAR, which was discussed in the preceding sections, was to define the root cause and conduct an investigation to determine the reportability of this situation. The following items are general descriptions of activities that have been previously identified in the Responses to NRC Requests Regarding Plant Fill. These items involve an extensive reanalysis which includes changes which will correct the error identified in this MCAR. These activities will continue to be tracked by that previous effort, and are separate from the MCAR.

- 1) Continue seismic reanalysis of the auxiliary building considering the current building configuration (e.g., tornado shield), present soil conditions, and proposed plant fill remedial action (e.g., caissons under electrical penetration areas). This analysis will incorporate the modified model described in Corrective Action 3 above.
- 2) From Item 1 above develop revised seismic forces, moments, and response spectra.



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- 3) Review existing structural designs and equipment qualifications for adequacy to revised items listed in Item 2 above. If this action discloses discrepancies, corrective action measures will be implemented.
- 4) The affected FSAR Figure 3.10-7 has been identified as subject to change at a later date in the Responses to NRC Requests Regarding Plant Fill.

## Reportability

This subject was reported by Consumers Power Company to the NRC as a potentially reportable 10 CFR 50.55(e) item on January 21, 1981. To date, it has not been established whether this item is "reportable" under the criteria of 10 CFR 50.55(e). Reportability will be addressed in subsequent reports based on the results of the "Investigation" above.

Submitted by: SR

Approved by: M. Swenberg for L. H. Curtis

Concurrence by: W. Q. Bailey